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| **Lesson Title:**  **GETTING TO KNOW “UNKNOWN VARIABLES”**  **Common Uses of Variables in Algebra** |
| **Subject area / course / grade level:**  **Algebra / Math / Grades 5** |
| **Introduction:**  This lesson is designed to focus on variables in expressions and simple equations. It is to be taught after the students have been introduced to order of operations. |
| **Lesson Length:**  **60 minutes** |
| **Materials:**  Math Journals  5 Large Sheets of Paper  Computer/ELMO  Paper and Pencil |
| **Lesson Overview:**  Students will begin the lesson with “**THink Of A Number” (THOAN)** task(s). They will then play several rounds of a game entitled **“Guess My Rule”** as a whole class. Then they will break into groups to make up their own “Guess My Rule” to share with the other groups. These activities will enhance students’ former experiences with algebraic thinking as they discover general expressions to represent number patterns. |
| **Tennessee Standards:**  GLE 0506.3.1 Understand and use order of operations.  GLE 0506.3.2 Develop and apply the concept of variable.  GLE 0506.3.4 Solve single-step linear equations and inequalities.      **MCS/Math Power Standards:**    Grade 5 - Develop and apply the concept of an unknown variable to solve single-step equations. |
| **Lesson objective/outcome(s):**  **TLW:** Demonstrate an understanding of vocabulary used in algebraic thinking.  Discover general expressions using variables to represent number patterns.  Write and solve single-step equations using variables. |
| **ENGAGE**   * The lesson will open with a song called “Invasion of the Equations” followed by the activity below.   **Activity: THink Of A Number** **(THOAN)**  Below are two THOAN exercises that you can use to launch this lesson. Simply verbalize to students the *written* directions in the order given; encourage them to write their results in a “step-by-step” or vertical format, as it will be easier to see their starting and ending numbers. (For a key guide, a numerical example is given **in** **bold**. Also at each step, the algebraic expression is shown *in italics*, which helps to “prove” why the ending result is as it is.)  THOAN 1 - Written Directions **Numerical Ex.** *Algebraic Expression*   * Think of a Number between 1 and 100. **9** *n* * Add 4. **13** *n + 4* * Multiply by 3. **39** *3(n+4) = 3n+12* * Subtract 12. **27** *3n +12–12 = 3n* * Divide by your starting number. **3**  *3nn = 3*   THOAN 2 - Written Directions **Numerical Ex.** *Algebraic Expression*   * Think of a Number. **50** *n* * Multiply by 2. **100** *2n* * Add 10. **110** *2n+10* * Divide by 2. **55** *(2n+10) 2 = n+5* * Subtract 4. **51** *n +5–4 = n+1*   **NOTE:** For THOAN 1, students should end with the same number, 3. For THOAN 2, they should end with one more than their starting number. Other THOANs can be created to give different results. Based on the intended result of the THOAN exercise, sample questions can be posed to students with discussion following.  **Questions (Sample Questions - based on the THOAN exercise):**  1. (THOAN 1) What is your ending number? Did everyone get the same value? If so, why? Explain.  2. Compare your ending number to your classmates. Is it the same? If so, why? Explain.  3. (THOAN 2) How does your ending number compare to your starting number? Can you explain why?  4. Work with a partner to create a THOAN exercise with an ending number of 1 (*or* 2, 3, 4, 5, …).  5. Work with a partner to create a THOAN exercise with an ending value that is two more than your starting number  (or one less than your starting number). |
| **EXPLORATION**  The class will play a few rounds of “Guess My Rule” as a whole class. The class will be broken up into small groups of 2-3 students to create their own “Guess My Rule.” The teacher will look over each group’s problem before they are allowed to write their problem on the large sheet of paper. Once all groups have written their problem on the paper, the problems will be hung up on the wall throughout the room. The class will then rotate every 3 minutes to solve the other groups’ problems (We called this Around the Room Math). |
| **EXPLANATION**   * Once all the groups have gone around the room to solve the other problems, they will go back to their seats and as a class we will work each problem together. We will discuss the steps they took to solve the problems and if there were any problems. |
| **ELABORATION**  The students will record in their math journal the vocabulary words/definitions. They will create their  own “Guess My Rule” problems for a partner to solve.  **Vocabulary:**  equation, expression, input, order of operations, output, pattern, reasoning, single-step, symbols, unknown, variables |
| **EVALUATION**  Teacher/student observations and on-going discussion  Students’ created rules for the “Guess My Rule” game  Recorded notes and examples in students’ Math Notebooks |
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**Invasion of the Equations**   
     **Attack of the Unknowns!**  
  
 A and B  
 X and Y  
 How can we  
 Identify...  
 These things, my friends?  
 We need an equation  
 For instance, A equals B plus 3  
 So when we know the value of B  
 Then we know A.  Yeah, that's the key!  
    
**When B is known  
 Then A can be shown**     Invasion of the Equations!  
     Attack of the Unknowns!  
 J and K  
 Box and Star  
 Who can say  
 What these things are?  
   
 It all depends  
 We need an equation  
   
 For instance, Box equals 3 X minus two    
 Once you know X then you can do  
 The needed calculations, and you know what Box is, too  
   
 **When X is found  
 Then Box comes around**   
 X and Y  
 A and B  
 Star and Box  
 C and D  
   
 J and K  
 F and G  
 Triangle...  
   
 They’re not scary  
 They’re just very  
 Very very very  
 Variable.  
   
 **When one of them is known  
 The other can be shown  
 When one of them is found  
 The other comes around**   
     Invasion of the Equations!  
     Attack of the Unknowns!  
   
     Not scary  
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